

CLAIMS

1. A method of using wastewater sludge in the production of concrete comprising mixing cement, aggregate and wastewater sludge to form a concrete mix
5 characterised in that:-

the additional step is carried out of mixing the wastewater sludge with an alkaline solution to achieve a wastewater sludge and alkaline solution mixture having a pH equal to or in excess of 11.5, prior to
10 mixing with the aggregate and the cement.
2. A method of using wastewater sludge in the production of concrete as claimed in claim 1, in which the alkaline solution is a concrete hardener.
- 15 3. A method of using wastewater sludge in the production of concrete as claimed in claim 1 or 2, in which the alkaline solution has a pH of between 12.5 and 14.
4. A method of using wastewater sludge in the production of concrete as claimed in claim 3, in which the alkaline solution has a pH of between 13.5 and 14.
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5. A method of using wastewater sludge in the production of concrete as claimed in any preceding claim, in which a bonding agent is added to the concrete mix.
6. A method of using wastewater sludge in the production of concrete as claimed
25 in claim 5, in which the bonding agent is carboxylated styrene butadiene alkali.
7. A method of using wastewater sludge in the production of concrete as claimed in claim 5 or 6, in which the bonding agent has a pH level of between 8 and 11.
- 30 8. A method of using wastewater sludge in the production of concrete as claimed in any preceding claim, in which the wastewater sludge is in the form of dry sludge cake and water is added to the dry sludge cake, prior to the mixing of the sludge with the cement and the aggregate.

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9. A method of using wastewater sludge in the production of concrete as claimed in any preceding claim, in which a polymer is added to the wastewater sludge.
- 5 10. A method of using wastewater sludge in the production of concrete as claimed in any preceding claim, in which the concrete is stored for between 28 days and 6 months.
- 10 11. A method of using wastewater sludge in the production of concrete as claimed in any preceding claim, in which the aggregate comprises one or more of wacke stone, sand, sandstone, gravel, limestone, crushed shale, crushed seashells, pencil, quarried, kiln dried sand, grit, pulverised fuel ash, quicklime and recycled crushed concrete.
- 15 12. A method of using wastewater sludge in the production of concrete as claimed in any of claims 1 to 10 in which the aggregate comprises limestone.
- 20 13. A method of using wastewater sludge in the production of concrete as claimed in any of claims 1 to 10 in which additional cement is used instead of aggregate in the concrete mixture.
14. A method of using wastewater sludge in the production of concrete as claimed in any preceding claim, in which a detergent is added to the concrete mix prior to curing.
- 25 15. A method of using wastewater sludge in the production of concrete as claimed in any preceding claim, in which the alkali solution added to the wastewater sludge is Sika.
- 30 16. A method of using wastewater sludge in the production of concrete as claimed in any of claims 1 to 14 in which the alkali solution comprises a electrically charged (ionised) water/salt solution.
17. A method of using wastewater sludge in the production of concrete as claimed in any preceding claim, in which the alkali solution is added to the wastewater sludge in the ratio of between 1:200 and 5:200 parts alkali solution to parts

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wastewater sludge.

- 5 18. A method of using wastewater sludge in the production of concrete as claimed in claim 17, in which the alkali solution is added to the wastewater sludge in the ratio of 3:200.
- 10 19. A method of using wastewater sludge in the production of concrete as claimed in any preceding claim, in which the wastewater sludge, cement and aggregate are mixed in a ratio of 1:1:6 by weight to form the concrete mix.
- 20 20. A method of using wastewater sludge in the production of concrete as claimed in any preceding claim, in which the blended concrete mix is sealed in a heavy duty plastic container.
- 15 21. A method of using wastewater sludge in the production of concrete as claimed in any preceding claim, in which the wastewater sludge comprises between 8% and 55% of the concrete mixture.
- 20 22. A method of using wastewater sludge in the production of concrete as claimed in claim 21 in which the wastewater sludge comprises between 8% and 40% of the concrete mixture.
- 25 23. A method of using wastewater sludge in the production of concrete as claimed in claim 21 or 22 in which the wastewater sludge comprises between 8% and 25% of the concrete mixture.
- 30 24. A method of using wastewater sludge in the production of concrete as claimed in any of claims 21 to 23, in which the wastewater sludge comprises between 11% and 14% of the concrete mixture.
25. A method of using wastewater sludge in the production of concrete as claimed in any of claims 21 to 24, in which the wastewater sludge comprises 12% of the concrete mixture.

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26. A method of using wastewater sludge in the production of concrete as claimed in any preceding claim in which the percentage of liquid content of the wastewater sludge is between 50% and 97% and the percentage of solid matter in the wastewater sludge is between 3% and 50%.
- 5 27. A method of using wastewater sludge in the production of concrete as claimed in claim 26 in which the percentage of liquid content of the wastewater sludge is between 80% and 97%.
- 10 28. A method of using wastewater sludge in the production of concrete as claimed in any preceding claim in which the wastewater sludge and alkaline solution mixture has a pH equal to or in excess of 12.
- 15 29. A method of using wastewater sludge in the production of concrete as claimed in any preceding claim in which the wastewater sludge and alkaline solution has a pH equal to or in excess of 12.5.
30. A concrete product made in accordance with the method steps of any of claims 1 to 29.

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